

REMARKS

The claims have been amended to precisely recite that the silicon wafer that is heat-treated according to the method of the present invention to obtain a silicon wafer not containing COP is a silicon wafer containing COP. The amendments to the claims are supported by the descriptions, for example, in the first three full paragraphs on page 3 of the present application of the objects of the present invention and in the description of the embodiments of the method of the invention which describe that in the method of the invention the COP within the silicon wafer can be removed. (See, for example, page 4, lines 10-11).

The prior art and, in particular, the prior art cited in the Final Action dated January 14, 2008, i.e., Fusegawa et al. (US 2003/0106484) (hereinafter: "Fusegawa") in view of JP 2003-297840 (hereinafter "JP '840"); and Fusegawa and JP '840 taken further in view of various combinations of Haas et al. (US 4,119,441) (hereinafter: "Haas"), Asayama et al. (U.S. Patent No. 6,641,888) (hereinafter: "Asayama") and Momoi et al. (U.S. Patent No. 2002/0024152) (hereinafter: "Momoi"), are insufficient to support a case of prima facie case of obviousness of the claims as amended under 35 U.S.C. § 103(a).

The Office identifies Fusegawa as teaching a method of growing a silicon single crystal wafer which has been sliced from a silicon single crystal, wherein the silicon wafer is heat treated in an oxidizing atmosphere (citing paragraphs [0013] and [0030] of Fusegawa). (See the Advisory Action dated May 1, 2008, page 4, lines 11-14). The Office also identifies Fusegawa as teaching that heat treatment at a high temperature of 1150°C and in an oxidizing atmosphere of a silicon wafer having a high interstitial oxygen concentration can cause formation of defects such as OSF in the silicon structure (citing paragraph [0014] of Fusegawa). (See the Advisory Action dated May 1, 2008, page 5, lines 3-7 from the bottom of the page).

However, paragraphs [0013] and [0014] of Fusegawa describe the prior art with respect to the invention of Fusegawa and do not describe the method of the invention of Fusegawa (as does paragraph [0030] of Fusegawa). The invention of Fusegawa overcomes the deficiencies of the prior art as described in paragraphs [0013] and [0014]. A person of ordinary skill in the art would not have been motivated to modify the prior art as disclosed in paragraphs [0013] and [0014] of Fusegawa since the invention of Fusegawa overcomes the deficiencies of this prior art. Moreover, the description in paragraph [0014] of Fusegawa that heat treatment in an oxidizing

atmosphere of a silicon wafer having a high interstitial oxygen concentration can cause formation of defects such as OSF would have led a person of ordinary skill in the art away from heat treatment of the silicon wafer according to the teachings of JP '840 as proposed by the Office.

On the other hand, heat treatment (according to JP '840 or other prior art) of a silicon wafer obtained from a silicon single crystal grown under the conditions of the invention of Fusegawa would not have resulted in the method of the present invention. The method of Fusegawa produces a single crystal not having defects and thus a silicon wafer sliced from the single crystal would not include COP as required by the claims of the present application.

Notwithstanding the lack of proper rationale to support a conclusion of obviousness of modifying either the prior art as disclosed in Fusegawa or modifying the method of the invention of Fusegawa, the Office has not shown where JP '840 discloses a heat treatment which satisfies the formula:

$$[O_i] \leq 2.123 \times 10^{21} \exp(-1.035/k(T+273))$$

as recited in and defined by the claims of the present application.

The relationship:

$$O_i < O_{ieq} \exp(20SiO_2\Omega/\gamma kT)$$

taught by JP '840 is not the relationship:

$$[O_i] \leq 2.123 \times 10^{21} \exp(-1.035/k(T+273))$$

defined by the claims and thus no modification of Fusegawa or other prior art according to the teachings of JP '840 can result in the method of the present invention. The heat treatment in the method of the present invention requires the specifically defined relationship between interstitial oxygen concentration of the wafer including COP and the heat treatment temperature of the wafer. (Note the description on pages 16 and 17 where a sample A, which has a certain interstitial oxygen concentration and is heat treated at a temperature which satisfies the above relationship, had no defects (as determined as described on page 16) whereas a sample B, which has a certain interstitial oxygen concentration and is heat treated at a temperature which does not satisfy the above relationship, included such defects). The Office has not shown where the specific relationship between interstitial oxygen concentration and heat treatment temperature required by the claims is disclosed or suggested in the prior art and, in particular, has not shown where this specific relationship is disclosed or suggested in JP '840.

For these reasons, the combined teachings of Fusegawa and JP '840, alone or in combination with the other prior art cited by the Office, cannot result in the method of the invention.

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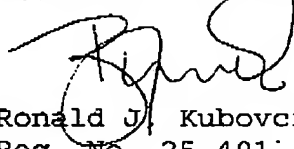
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SUBMISSION UNDER 37 C.F.R. § 1.114

PATENT
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Removal of the 35 U.S.C. 103(a) rejections of the claims of the present application as amended and an allowance of the claims are believed to be in order and are respectfully requested.

In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension and any additional fees may be charged to our Deposit Account No. 111833.

Respectfully submitted,
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